



Micsig MS510S Multi-function Oscilloscope

This portable unit has two fully isolated 100MHz scope inputs, a built-in isolated multimeter, 14.5cm (5.7") colour touch-screen, up to 190k waveform updates per second, 240k points memory and a battery life of up to 7 hours. It's supplied with a pair of isolated probes for measuring up to 600V (Cat II).

As portable scopes go, this new product from Emona has a lot of good features and comes at quite a reasonable price.

One of the reasons we asked to review this unit is that we recognise how useful it is to have a scope with two fully isolated channels; this makes it much easier to make measurements at two different points in a circuit which may not necessarily have the same ground reference.

However, you do have to be a bit careful using an isolated scope because this means that you can potentially (no pun intended!) have a high voltage not only between the input signal and ground but between those grounds and from each ground to earth.

So the probes and inputs need to be well-insulated to prevent accidental shocks.

This unit does not disappoint as it is supplied with two insulated probes that shroud the BNC connector shields, earth clips and test probes (to the extent possible). These are 500MHz, 10:1 types rated for 300V CAT III and 600V CAT II.

First impressions of the overall user interface are good. The screen has good contrast and colour and is easy to read indoors; it has an outdoor colour scheme which definitely helps for reading in sunlight. However the lack of an anti-reflective coating on the display means it would work a lot better with a hood or under shade.

The unit boots up fast – in just a couple of seconds – and responds to button presses pretty quickly. So it doesn't feel sluggish to use.

While the touch-screen can be used to perform many functions such as moving along the timebase, moving traces up and down, zooming into portions of the waveform and selecting measurements to display, virtually all functions can also be performed using the front panel buttons and side jog wheel (see photo at left).

The operation of this unit is quite different to most benchtop scopes but users will quickly figure out the controls and get used to them. Like most digital scopes, it has soft buttons (F1-F4) which drive the on-screen menus.

As you can also see from the photo, the control layout below these is pretty simple and the function of most buttons is self-evident.

Review by Nicholas Vinen

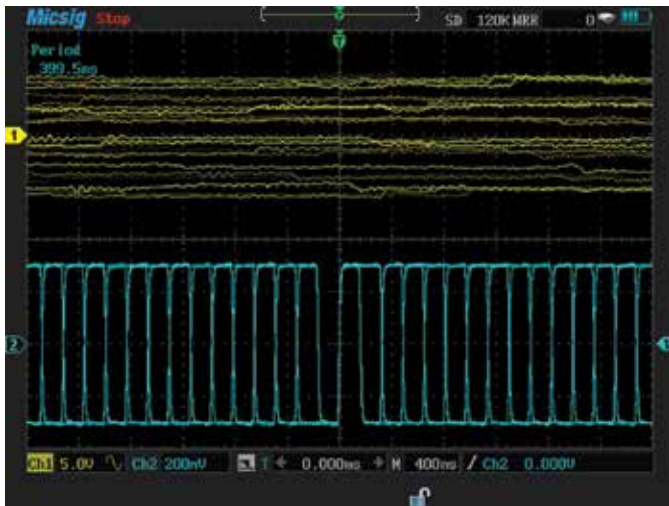


Fig.1: this screen grab operating in scope mode demonstrates the display persistence. One measurement has been enabled (period for channel 2) and this can be seen at the top of the screen. The lock icon at the bottom indicates that the touchscreen can be temporarily 'locked out' with a button press so accidental touches won't have any effect.



Fig.2: the unit operating as a multimeter, with the buttons to select various modes at the bottom of the screen. These can be selected using the touchscreen or side jog wheel. One soft button enables relative measurements while the other resets the statistics, displayed at the top of the screen. Time stamps for the min/max readings are a nice touch.

The scope is 165mm wide, 255mm tall, 62mm deep (not including side carry strap) and weighs 1.7kg. It has a tilting stand at the back to prop it up on a flat surface.

Supplied accessories include the two probes, a set of multimeter leads, mains charger, user manual and PC software on CD and warranty card.

Scope functions

Each channel has a selectable sensitivity of 5mV-50V/division so with the supplied 10:1 probes, that gives a range of 50mV-500V per division. The sampling rate is 1GS/s with one channel active and 500MS/s with two. As stated earlier, storage is 240Kpoints total so with both channels active it can store 120K samples. Channel bandwidth can be restricted to 20MHz if required and each channel can be AC or DC coupled.

This scope uses a 9-bit ADC which is slightly better than bargain basement scopes (including desktop models) which typically use an 8-bit ADC. As such, when the bandwidth is set to 20MHz, the traces are quite clean, however there is still a fair bit of noise evident with 100MHz bandwidth (this setting affects both channels simultaneously). You can of course enable averaging to reduce noise with repetitive signals; this is also enabled for both channels at once.

By default, the scope has trace persistence, which can be handy in some circumstances as it allows you

to see the 'spread' of the signal, eg, get an idea of jitter in a digital signal or amplitude stability in an analog signal. But sometimes you want to turn it off to get a 'cleaner' looking trace – unfortunately, we can't figure out how to do that with this unit. The minimum persistence setting is 100ms. This isn't a huge problem but it does seem to be an oversight in the software.

You can display up to four measurements in scope mode, selected from a large list and these appear at the top of the screen, overlapping the graticule. They're updated a couple of times a second. The unit also has basic X/Y cursors that can be enabled and moved around in the usual way.

Typical trigger options are available, including Edge, Pulse, Logic (ie, high/high, high/low, etc), Video (including high definition) and Serial Bus. The hold-off time is adjustable as is the trigger coupling (AC/DC).

Serial bus decoding

While this is not a mixed signal scope, it does have an option to decode various serial buses and trigger on the contents of the packets. This includes serial, LIN, CAN, SPI and I²C although given the fact that there are only two channels, it's more suitable for I²C than say SPI.

The version we tested (MS-510S) has the serial bus decoding option; the MS-510IT is the equivalent model without it. The difference in cost is \$888 + GST. That's quite expensive

for a software option but if you need it, you need it.

Multimeter functions

The built-in multimeter is easy to use because of the large touch-screen. It's easy to switch modes by pressing on their icons and the numeric display is large. One aspect we particularly like is that it auto-ranges almost instantly, which overcomes one of the biggest arguments against auto-ranging meters (which, let's face it, are pretty much standard now).

However, there is one major drawback apart from the modest 4-digit resolution and that is that you need an external accessory to do current measurements – either a shunt or a hall-effect sensor (clamp meter).

These are available as accessories; however Emona do not currently list them or have a price. So that probably means you need a multimeter on hand, in addition to the MS510S.

But that's not to say the multimeter functions are useless – far from it. It offers DC and AC voltage in ranges such as 500mV, 5V, 50V, etc with a maximum of 1000V DC and 750V AC (20kHz bandwidth). The multimeter inputs are fully isolated from the scope inputs. It also does statistics (minimum/average/maximum) and has a bar graph in addition to the numerical read-out – see Fig.2.

Other modes include resistance (0-50MΩ), continuity (50Ω threshold), diode test (up to 3.5V), capacitance



Fig.3: the 9-bit ADC means that the trace display is quite clean; much of the ‘fuzz’ visible here (such that there is) is due to the DAC producing the waveform, rather than the scope. The lack of signal linearity where the slope changes are quite clearly visible. It’s possible to zoom in on a section of the waveform by dragging a box using the touchscreen.

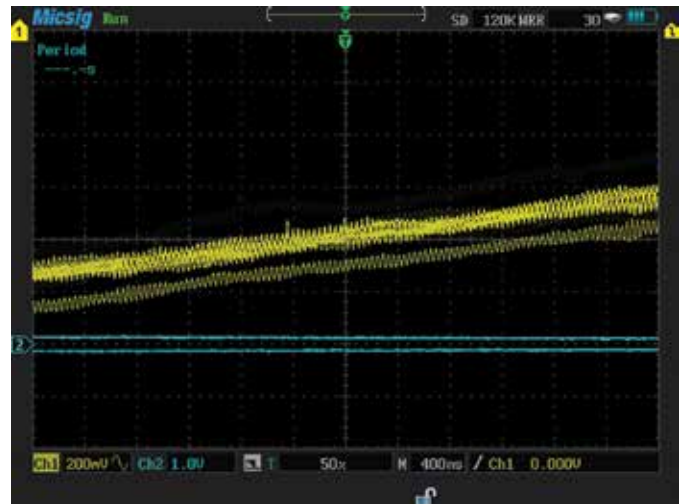


Fig.4: zooming in further, the bandwidth is sufficient to capture the DAC switching noise of the instrument producing the test waveform. The persistence allows two complete sweeps of trace data to be seen simultaneously; the persistence time can be adjusted to show more but with noisy signals, this can cause the display to become indistinct.

(100pF-50μF), temperature and humidity (again, requiring an external sensor accessory) and pressure (ditto).

One nice feature of the scope is that the multimeter inputs can also double as calibration outputs for the probes. Small adaptors are supplied to make the connections.

Data logging

The unit also has a “Recorder” mode where it can log readings from either the meter or scope input(s).

When logging from the meter, you can choose from DC volts, AC volts or DC+AC volts. You can also log DC amps, AC amps, temperature, humidity and pressure but all these extra modes require the appropriate accessory.

The readings are displayed in an automatically-scaled horizontally scrolling chart format and the data can then be saved to a USB flash drive (in a “.MMR” file format) or in a screen grab of the chart.

It can be set to either stop storing data when full, or set to a circular buffer mode where it overwrites the earliest data with later data once storage space is exhausted.

For data logging from the scope input(s), it can either log a low-frequency view of the two input channels or alternatively, it can log one or two of the scope measurements.

In the latter case, you need to first enable the measurements you require on the appropriate channels, then

switch to Recorder mode and select the measurement(s) to log.

The logging frequency is 10 seconds to 20 minutes per data point in multimeter/scope measurement recording mode and 10 milliseconds to two minutes per data point in scope trace recording mode.

You can play back the recorded data on the unit or offload it to a PC for further analysis and plotting.

Connectivity & battery life

There are two USB sockets on the side of the device, one for a USB flash drive and one for a cable to connect to a computer. As described above, you can log data to the flash drive but you can also save screen grabs, settings and waveform data. Screen grabs can also be captured in multimeter mode.

When connected to a computer via a USB cable, custom Windows software is required to interface with the scope (supplied on the CD). This allows the unit to be operated directly from the computer and data (eg, waveforms) can be transferred to the PC.

The battery is a Lithium-ion type and is user swappable. There are two types, standard (4-5h) and extended life (6-7h).

We don’t know which was supplied with our test unit but we ran it for a couple of hours and the battery meter still indicated it was more than half charged.

Charge times are similar to discharge times, ie, the standard battery takes

about five hours to reach full charge.

Conclusion

As portable scopes go, this one is a pretty attractive proposition. Even for bench-top use, the dual isolated channels and ability to easily move it around are quite useful features. While we would like to see a couple of software tweaks and an anti-glare coating on the screen, it’s a very flexible instrument with good overall performance and a responsive user interface.

While the MS-510S is not light, it can be operated hand-held and with the protective rubber surround, appears to be robust enough for field use.

The MS-510S is available from Emona for \$2790 + GST. The MS-510IT, without the serial bus decoding option, is \$1902 + GST. 200MHz models of both are available for an additional \$191 + GST.

For applications where performance is not so critical, the MS-310IT is a cheaper option at \$1446 + GST. The main difference is the waveform update rate – it’s 190Ksamples/second for the MS-510 and less than 50Ksamples/second for the MS-310. Emona also carry the MS-200T series which are cheaper again but do not feature isolated inputs.

For more details, visit the Emona website at www.emona.com.au or email testinst@emona.com.au

Alternatively, contact Emona head office on (02) 9519 3933. (Interstate office numbers are on their website). **SC**